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PREFACE

The following lecture, titled Evolving Standards for Joint Interoperability: Cultural & Political Considerations was presented at the Armed Forces Commications and Electronics Association *DoD Database Colloquium 93*.

The four admirable and broad goals of the 10th Anniversary Database Colloquium will provide an opportunity:

- To exchange information on Information Resource Management problems, and present requirements and solutions;

- To provide discussions on the broad range of applicable technologies;

- To provide policy guidance applicable to DoD and civil agency Information Resource

managers;

·An to identify and encourage service-unique and government-wide standardization efforts and information/technology transfer.

This paper will concentrate on the substrata of all the above areas. None of the goals nor the topics of particular attention are insurmountable nor particularly difficult to "solve"-- in fact, successful and outstanding examples of implementation could probably be found in the private sector for each of the topics listed in the "Call for Papers" flyer. The major obstacles to Joint Interoperability, in general, and the development of standards, specifically, are neither technical, technological, nor methodological. The hurdles to overcome, and which can significantly derail the thrust of Joint Interoperability, are cultural, political, and ultimately, personality-driven. This lecture will briefly address DoD-specific cultural characteristics and their impact on data sharing, then examine the political position of information support organization (ISOs), and conclude with an analysis of the peculiarities of the personalities and cognitive strategies of employees who gravitate to ISO and information technology.

The author has first-hand familiarity with intra-service cultural boundaries: family members have served the USA Corps of Engineers, Infantry, Cavalry, Medical Corps, and Legal Dept. Work experience in USAF and Department of the Navy has demonstrated similar "patriotism" towards a member's own branch, or culturally demarcated group. Perhaps a fitting example of this often good-hearted competition could be shown with the aviation community: loyalty proceeds downwards from the service designation (USAF, USN, USMC) to the aviation groupings (fighter pilot, bomber, AWAC)--one agreement found among pilots regardless of service is that of them all, the helicopter pilots were uniformly regarded as the "craziest." Unfortunately, the cultural history of the services, and then the functional areas within the services, has been to specialize and operate in a unique administrative orientation, with significant ramifications for the current strategy of Joint Interoperability. The surfacing of redundant systems, being done under the CIM Initiative, has adequately documented this phenomenon.

Clearly, redundant systems serve as symptoms of a deeper malaise, which isolates data groupings, establishes monolithic infrastructures, and impedes rational and simple retrieval or sharing of data. Such problems, while expressed in technology, are political at their source. Why, for instance, should not Navy researchers working on Navy missiles be able to exchange information regarding their work, without having to be validated by two or more bureaucracies? If Walmart and K-Mart can co-opt their suppliers to the point of being able to hand off the inventory monitoring and supply function, why does it take three to five years to buy a mainframe computer in DoD? How did a service end up with nine to eleven different versions of a unit identification code -- codes that were not always in the same data format? The decision to include or not include hyphens in a SSN is intrinsically political if the decision is made consciously in isolation and willfully disregarding the structure of other systems with which an organization must interact. So too, choice of a mainframe architecture which restricts interoperability must be understood as a political choice, whether it isolates one on the leading edge or the receding plateau.

Naming, in and of itself, is a quintessential human activity; through the act of naming the object, many powerful things are accomplished in one swift and symbolic act. The named object, henceforth, will always be owned in part by the Namer, even if the Namer is benign and shares freely. An eloquent and appropriately bemused author captured the problem beautifully in writing about the reintroduction of the sacred and mythic to human culture....but relate this passage directly to interoperability and meaning holds:

> If we are to begin again, we must be properly admonished but not disheartened by the dangerousness of the enterprise....In the center of that danger is the waywardness of language itself. The names we distribute in the beginning...may well compose the fabric of meaning within a culture, but they also create the possibility of mischievous nonsense. (Originals of the Sacred, Dudley Young, St. Martins Press, New York, p. 38).

Much of the current mischief retarding interoperability is traceable to the original autonomy of the armed services; as these forces matured, the cultures became more entrenched and more supportive of their parochial goals. When understood within the context of cultural development, the language which evolved in each environment is both fitting and right, it is the recasting of our national goals and the reshaping of the global context that now calls these autonomous cultures into question.

The checks and balances of the Constitution created a form of government in which the vesting of authority became diffused and made manifest in three separate but equal entities: the Congress, the Executive Branch, and the Judicial Branch. Not surprisingly, the governmental bodies our unique system created for the common defense mirror the "chicken and egg" quality that resists the question of who is strongest, and who should lead the others. Defense leadership becomes a situationally driven role, shifting as the requirements and environment of the battlefield demand. Only when we are no longer on the battlefield, but in venues like this conference, dealing with the draining trivia of administrative functions, does the difficulty of our interrelationships become paramount.

If the cultural identification of each service has served the nation in the pst, and in fact, has formed a foundation for each service's peculiar "personality" and set of strengths, how can we take advantage of these strengths rather than pit them against each other in a fruitless and barren exercise? Standards imposed on resistant organizations can be met with the most frustrating of bureaucratic weapons: malicious compliance. How do we plot an evolutionary move to interoperability that combines comfort with cost-savings?

Given the cultural barriers to Joint Interoperability, which up until the past few years, were apparently reinforced and supported by Congress and the Executive Branch, the question becomes: which group within the services should have primary responsibility for fusing information management, technology, and services? Quite obviously, those with implementation responsibility would include telecommunications, hardware, system software, application software, IRM, database administration, etc. But the thrust, authority, and functional expertise, must be a top-down, executive mandate from the operations or line functions. Long-term evaluation of ISOs, from an organizational perspective, can identify the following limitations for this task:

- Political naivete
- Isolation from functional mission
- Line managers' perception as a "support/overhead" cost

For at least the past 15 years, articles, books, and conferences have cried out for greater business acumen on the part of ISOs; the flaw of this hue and cry derives from the basic requirements of outstanding systems development . As an isolated discipline, system development rewards logic and sequential problem-solving -- not the holistic/perspective skills of an adept political manager. ISOs themselves recognize their limitation as shown in a recent survey in Datamation (January 1, 1993, p. 28); the top four goals they identified for themselves were as follows:

- Using IT to improve company quality

·Using IT to improve company productivity
·Reducing IT costs/budgets
·Reshaping business processes

A Computerworld survey (November 16, 1992, p. 149) demonstrated overwhelming concurrence with the following statements:

·IS needs to be more business-oriented (91.8%)
·Information technology is key to a competitive advantage in my organization's field of business (91.4%)

ISOs view themselves as contributors to the ultimate success of the organization, while they recognize their inability to fully integrate with the "business" end of things. If we understand the mindset of logically skilled employees, we know they will forever be trying to be "more business-oriented."

The characteristics of ISO employees, and their greatest strength and value, derive from an Apollonian commitment to logic, analysis, and the inherently binary world in which they work. Such an orientation to logic, sequential reasoning, and analysis, however, is the hereditary "gene" for ISO's political ineptness. Organizations operate in the basis of power and politics, and the inability to swim in such an environment will limit the expertise required and the facility for implementing change. Management's repeated demands for analysts with more "business savvy" or "soft skills" conflicts head-on with the cognitive strategies and problem-solving approaches of ISO employees; these repeating themes in trade publications demonstrate how the demands and skills tend to be mutually exclusive.

Unfortunately, knowing the need and solution is not the same as accomplishing its fulfillment. Some organization's response to the dearth of business savvy in ISO's is to place non-technical individuals in management positions. Some companies have even gone so far as to use non-technical managers as project leaders: "The sponsor-as-project-leader approach is another expression of the same corporate impulse that leads to the appointment of a nontechnical person as CIO -- a way to make IS answerable to business concerns." (Datamation, July 1, 1992, p. 55)

IT and the human resources represented in the skillful analysis and logic of ISO staff are a central contributor to any organization's future success; how those resources are directed necessitates understanding and appreciation. In sum, the ISO has an unassailable and central role in the planning and execution of the means for interoperability, but the mandate, authority, and expertise required to "turn the ship around" must stem from the highest levels, with the ISO as the closest advisor. Information technology enables the goal of interoperability, just as database manage-ment systems (DBMS) support and enhance data custodian responsibilities and client/server architectural options offer significant cost savings. These technical enablers do not resolve data conflicts, ownership issues, or standardization. Only skillful, politically adept, and motivated functional managers can accomplish the goals of interoperability.

The institution of Joint Interoperability, clearly the apotheosis of a political effort, will tax the negotiating skills of the most political of managers. Relinquishment of autonomy, forfeiture of ownership, external imposition of standards -- these are some of the real and perceived downsides of interoperability. What must be demonstrated to each of the services is the mutual benefits to be gained, the sharing of budgetary sacrifice, and the much easier acceptance of hardships self-imposed rather than externally mandated.

Along with the understanding of political and cultural realities as a precursor to formulating and

achievable approach to interoperability, we must accord the warriors, the managers, and the analysts their own recognition. As archetypes in human culture, they have not noticeably banded together. Interoperability means dramatic and radical changes in each group's culture; this initiative, uncoupled with an aggressive training and re-education program, will not accommodate the human requirements. MIT researchers found that organizations adding high levels of technology without innovation to the human resource, did worse than those that only innovated with human resource practices (Davenport, Process Innovation, Harvard Business School Press, 1993, p. 234) The critical need for training in non-technical skills such as facilitation, negotiation, organizational psychology, etc. will be a *sine qua non* for the ISOs tasked under the CIM Initiative. The real challenge facing Joint Interoperability is not one of technical experimentation, but of that oldest human endeavors -- discourse, negotiation, compromise, and hopefully, understanding.

- Nancy Lee Hutchin

"DoD's Enterprise Information & Integration Management Initiative"

Background

Dramatic changes in information technology over the last decade have transformed business and industrial operations. Manufacturing processes that were once manually operated and manually controlled are now highly automated and, in many instances, totally unmanned. The focus on product acceptability and customer satisfaction has forced quality improvements to levels previously thought to be unattainable. Inventories are more efficiently managed; production times are more tightly controlled; and, defects are greatly reduced.

Concurrent with the availability of more powerful and cost_efficient information technology is a resurgence of the functional manager in making decisions about which and how much information technology will be applied to his/her business. Rarely is the availability and application of information technology dictated by the information technologist. The accountable business manager is the decision maker. He/she must constantly improve the business processes used to produce quality products for the customer. The use of information technology is only a means to that end.

In contrast to business and industrial integrated and automated operations, the Department of Defense (DoD) finds itself in a posture characterized by the proliferation of disconnected, stand_alone information applications. These applications have been built over the past 10_20 years to support the isolated needs of the functional manager, with only secondary consideration for the corresponding information activities of other functional communities within the Department. To further compound the problem, multiple applications confined to a single DoD functional area have been equally devoid of connectivity to other applications within that same functional community. It can be argued that significant money, time and effort is spent in transferring, reconciling and deconflicting information both within functional communities as well as across functional lines within the Department. A recent and critically important example of the resulting inefficiency and havoc that results from this situation occurred in DESERT STORM. The information community that served the warfighting capabilities in the DESERT STORM theater were plagued with incompatibilities of data, communications, and application functionality. This same problem exists in the day to day activities of the mission support (e.g., personnel, health, finance, logistics, environment) functions that DoD relies on to transact Department business.

OASD(C3I) Enterprise Integration Initiative

It is because of these incompatibilities and inefficiencies that the Department, through the Office of the Assistant Secretary of Defense for Command, Control, Communications & Intelligence, has undertaken the "Enterprise Information and Integration Management" initiative. This initiative will result in fewer information applications operated at less cost with greater intra_functional and cross functional compatibility of the critical information

required to manage our mission. DoD is pursuing an aggressive program to integrate its information support activities with the re_engineered mission critical (i.e., command & control, intelligence) and mission support processes needed to operate the Department, from the Office of the Secretary to the base/post/installation infrastructure.

Description of Current Effort

The DoD's Enterprise Information and Integration Management initiative is the largest program of its kind ever conceived by any U.S. private sector or government organization. The Defense Information Systems Agency has been chartered to be the agent for implementing this program. The initiative calls for a major re-engineering and restructuring of business and operational methods and processes throughout the DoD followed by the integration of the data as well as the information processing resources and applications.

From 1990 to present, DoD has moved from concentrating on improving information management in selected, and sometimes isolated, business operations (e.g., contract payment, civilian payroll, distribution centers, and medical applications) to applying functional process improvement methods to all DoD mission areas, including command and control, and intelligence.

Integrating mission and mission support functions, information resources, and the information system support environment of the Department involves coordinating several complementary initiatives. Not all these initiatives are directly managed from within a functional area, but across several functional and technical areas. Planning and executing the interactions among these initiatives requires a disciplined approach involving intense examination of the programmatic functions, the data required to perform those functions, and the technical architectures which dictate the information processing and support activities. Without such close examination, the essential needs of the mission area cannot be defined and, equally important, the non_essential functions which hinder responsiveness to customer needs cannot be isolated for elimination.

The Defense Enterprise Information and Integration Management initiative views integration as an iterative activity which must occur in a multi_dimensional manner within and across all elements of functional and information management. Integration is implemented by making a series of finite improvements to the functional processes used to operate the Department (i.e., literally **"RE_INVENTING" and "RE_ENGINEERING"** the way DoD does business) and then coupling data, communications, and information technology architecture changes which support the functional improvements. The initial integration efforts within DoD focus on several prototype programs designed to validate the concepts of integration and to demonstrate to the Department's leadership the operational improvements and cost effectiveness of the integration initiative.

As a beginning, the DoD has undertaken four key integration efforts: the Command, Control, Communications, Computers & Intelligence for the Warrior integration framework; the U.S. Marine Corps Standards_based Architecture initiative; the U.S. Army Sustaining Base Information Systems program; and, the Civilian Personnel Shared Database Regional Service Center prototype. Each of these efforts is intended to demonstrate the value of the integration initiative. They will provide a clear sense of DoD missions, improve customer service, reduce the cost of both functional and information processing activities, and strip out non_value_added activities.

A simplified hierarchial "DoD Integration Architecture" (see Figure 1) provides the basis for discussing the meaning of integration, identifying key intersections (or boundaries) within the framework, and assigning responsibilities for managing integration at those intersections. The integration architecture has seven levels: the global level, the DoD-wide enterprise level, the mission level, the function level, the application level, the local level, and the personal level. Rules developed at higher levels are inherited and applicable at lower levels, and then extended to meet specific requirements across all levels. Integration issues must be addressed between each level. Except at the global, DoD-wide enterprise and personal levels, integration issues must also be addressed among the subdivisions within each level.

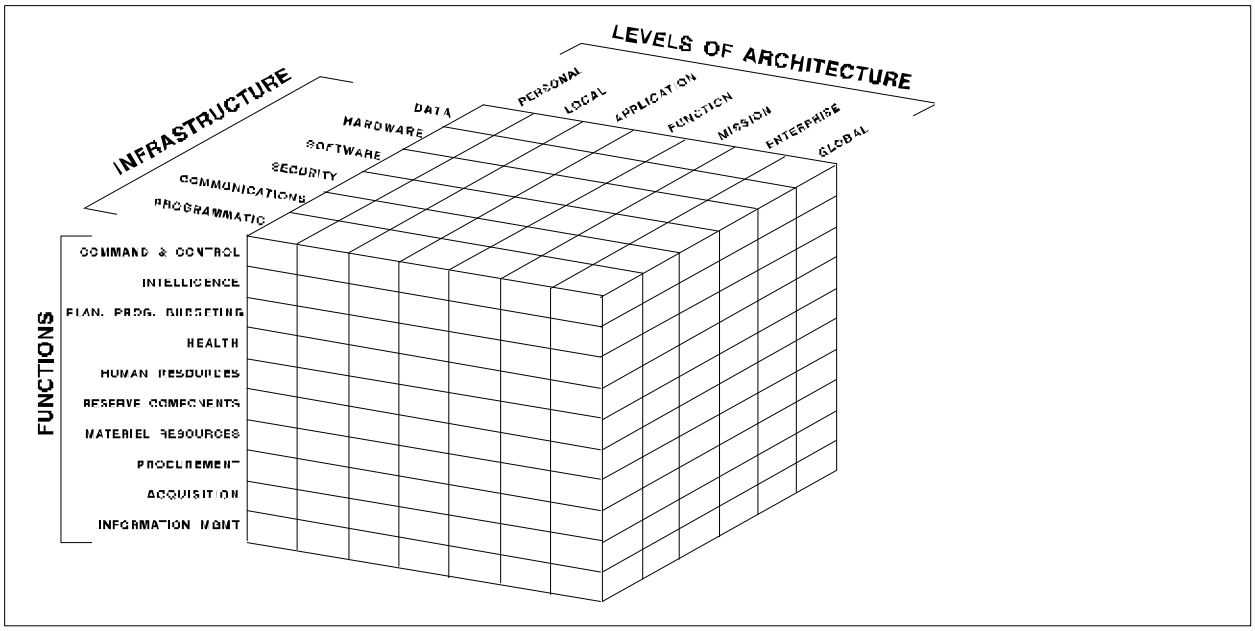
The Global Level contains the industry standards and commercial off-the-shelf products and services which DoD

incorporates into its infrastructure. The Enterprise Level includes those elements of information management that are mandatory across the entire Department. This includes DoD policy and doctrine, implementing information on technology capabilities (e.g., technical and data standards, reference models and technical architectures, methods and tools, and shared computing and telecommunications services). The Mission Level includes the major missions of the Department. Here, areas of specialization and focus emerge where mandatory DoD-wide functional and technical requirements are supplemented with mission-specific requirements and capabilities.

At the Function Level lie the functional areas and functional activities of the Department, and the subject-matter databases that support them. Integration issues occur among and across functional areas as well as between levels. The Application Level includes the development, maintenance, and operation of information system applications that provide the required automation support to the Department's functions. Integration at the boundary between the application level and the function level encompasses access to subject-matter databases and other system functionality issues that enable the DoD to operate effectively its information technology and information services.

The Local Level addresses customer support requirements that involve integration with both the application and personal levels. The Personal Level serves to preserve privacy, individual choice, and personal preference at the desktop or workstation.

Historically, the Department has viewed integration in single-dimensional terms, with different elements of information accorded uneven and inconsistent attention. The consequences were "stovepipes" within individual functions, organizations, and areas of information technology with elements of "interfacing" and "interoperability".



The Defense Enterprise Information and Integration Management program views integration as an iterative activity which must occur in a multi-dimensional manner within and across all elements of information management.

Integration may be viewed from an infrastructure perspective with aspects of programmatic, data, hardware, software, communications and security characteristics. Each characteristic will apply vertically within, and horizontally across, functional areas. Within a functional area, programmatic integration will range from developing an application supporting specific processes, through making programmatic budget decisions at the enterprise level. Functional integration between functional areas will occur as related processes are identified and addressed. Physical data integration will provide shared databases within a functional area, and through the operationalizing of the DoD Data Administration program and the DoD Data Repository System across the

Department as a whole. Hardware, software, communications and security characteristics, which will enable the integration, will themselves be integrated through the development and utilization of standards-based architectures (i.e., POSIX, GOSIP, OSE), enabling technologies (i.e., CALS, MLS), and tools (i.e., I-CASE).

Figure 2 illustrates this view of integration. With integration addressed in this manner, the Department-wide information infrastructure will provide a resource which totally supports the missions of DoD.

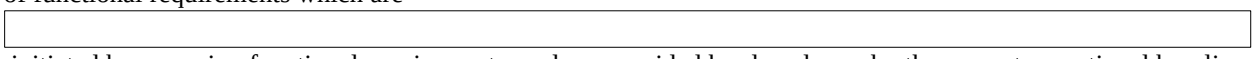
DEFENSE INFORMATION SYSTEMS AGENCY
CENTER FOR INTEGRATION AND INTEROPERABILITY

The Defense Information Systems Agency (DISA) established the Center for Integration and Interoperability (CFI&I) to serve as the systems integrator in fulfilling DISA's DoD integration mission by providing the focal point for system_of_systems integration and engineering of the Defense Information Infrastructure and for top_level systems integration over all DoD mission/function information systems. CFI&I supports the Office of the Secretary of Defense, Command, Control, Communications and Intelligence in the implementation of the Information Management (IM) program as it relates to the integration goals and objectives of the DoD and is the single DISA organizational element responsible for providing support to customers in implementing OSD guidance on migration systems, data element standards, and process improvements. CFI&I integrates the subprocesses of the DISA systems integration and engineering process on behalf of the DoD customer within the enterprise strategic plan developed by the DISA staff. CFI&I provides Integration Managers for each of the DoD functional communities. CFI&I provides integration support to each functional community, including requirements analysis and integration, assessments, development of migration strategies and implementation plans, integration and configuration management, technical management planning, and support for functional information management decision_making bodies. CFI&I provides a lead integrator for each DISA program manager. CFI&I identifies interoperability conflicts and supports the issue resolution process for all integration engineering issues through established decision_making bodies.

Concept of Operations

The concept of operations for integration management describes an ongoing activity which is performed again and again in iterations initiated by functional requirements and/or technical opportunities, and accomplished within the framework of overall Department level strategic plans. As shown in figure 3, the overall view of these operations is that of a "give and take" relationship between functional need and technical capability. Functional requirements "give" objectives which the technical community "takes" as challenges for defining technical responses in support. Technical innovations "give" new options to the functional community which are "taken" as new opportunities to revise business practices and methods. The iterations between the functional and technical communities are ongoing and continuous. The need to manage this relationship can be defined as the cornerstone requirement of integration.

Functional direction is provided at a high level by DoD Principal Staff Advisors (PSAs). Enterprise and mission level integration occur at this level through consultation and information_sharing between the PSAs. Functional Activity Program Managers (FAPMs) focus on the requirements of specific functional areas, including cross_functional requirements defined and supported by the PSAs. The specific product of this interaction is a set of functional requirements which are



initiated by emerging functional requirements, and are provided borders drawn by the current operational baseline and new technological frontiers.

Technical direction provides both a response to, and an opportunity for, new functional capabilities. DoD

technical direction is the responsibility of several DISA Centers. Such direction takes the form of information engineering tools and methods provided to the functional community and to technical developers, as well as architectural, engineering, testing, security, and standards support provided to functional planners, technical developers, acquisition organizations, and operational support centers. At the operational level, system developers attune technical direction and support provided by the DISA Centers to the functional requirements, resulting in the deployment and operation of DoD systems which close the loop by providing the automation payback to the functional user community.

The role of DISA CFI&I is to manage the effective combination of policy, functional requirements, DISA technical products, and baseline investments in technology to achieve DoD standard systems. Integration management orchestrates the hand_off of products and the interfaces between the multiple organizations, coordinating project activities across all functional areas. As a result, the functional and technical aspects of Information Management are unified in support of Command, Control, Communications, Computers and Intelligence (C4I) for the Warrior with the deployment of systems which are integrated by design, interoperate with legacy systems via seamless interfaces, and reduce the costs of maintaining effective applications across the DoD.

CFI&I Organization

CFI&I's organization reflects its DoD_wide customer support mission in the areas of integration and interoperability. Designated Deputy Directors function as the focal point for integration in groups of functional areas such as Command, Control & Intelligence (C2I); Acquisition and Technology; Electronic Commerce/Electronic Data Interchange (EC/EDI); and Finance, Personnel, Health. The general areas are further broken down into specific functional areas such as Global C4, Theater/Tactical C4, Intelligence, Materiel, Distribution, Environmental Security, Procurement, Acquisition, Transportation, Finance, Civilian Personnel, Military Personnel, Health, and Reserve Components; each led by Integration Managers. Each Integration Manager provides a support staff to work with managers and developers of specific initiatives, as requested by the customers. Cross_functional support in the areas of contracts and resources is provided by the CFI&I Directorate of Plans and Programs. CFI&I is also expanding the realm of functional area support to include other areas such as Cross_functional support is provided by CFI&I's Directorate of Cross_Functional Integration and Directorate of Methods and Strategies. The Integration Liaison group provides communication and liaison services to assist in integration of CFI&I activities with related activities across DISA. This organizational structure enables CFI&I to provide comprehensive integration services to managers throughout the DoD.

CFI&I's Integration Managers are involved in all aspects of planning, migration strategies, and configuration guidance. The Integration Managers also provide guidance and direction to technical developers. In this way the Integration Managers ensure integration and interoperability of information systems within and across functional operations within DoD, as well as system interfaces external to DoD. Integration Managers are also responsible for establishing and providing procedures for integration management and configuration control for information systems development and modernization, and technical interface control between systems, while conforming to approved architectures and complying with DoD's technical environment.

Integration End Products or Services

CFI&I serves the Joint Chiefs of Staff (JCSs), Principal Staff Advisors (PSAs) in the Office of the Secretary of Defense (e.g., Assistant Secretaries of Defense), Functional Activity Program Managers assigned by the PSAs, Functional Information Managers in the office of DASD(C3I)(IM), and Commanders to Directors. Products and services provided include:

DOD INTEGRATION STRATEGY

A high level overview of DoD IM strategy plan for selecting and deploying cross-functional technical capabilities across two or more Functional Activities. An Integration Strategy is prepared to ensure cross_functional integration and interoperability.

DOD INTEGRATION STRATEGY ASSESSMENTS

Validates all plans and migration strategies for conformance with corporate IM architectures and standards, and proposes changes to strategies and plans that accelerate the migration of information systems to corporate IM architectures and standards without degrading planned performance and cost efficiencies.

DOD MIGRATION STRATEGY

A high level overview, including proposed implementation plans, projected cost estimates and anticipated deployment schedules, for selecting and deploying a migration system throughout a Functional Activity.

INTEGRATION DECISION PAPER

A high level plan describing the proposed selection and deployment of a migration system. The decision paper describes both the baseline environment and the proposed migration system. In addition, the paper includes an overview of the proposed schedule and projected cost savings. The paper is used in support of preliminary migration decisions and is required for Major Automated Information System Review Council (MAISRC) as a companion to system decision papers.

TACTICAL INTEGRATION PLAN

A preliminary implementation plan for an approved migration path. The plan specifies integration requirements of applications and includes a proposed deployment schedule and budgetary requirements over the migration system's life cycle.

Keyed to specific requirements, CFI&I provides a specific set of services within the scope of the following broad set of IM functional area support responsibilities, including:

- facilitate the definition, design, development, operation, and maintenance of systems in accordance with corporate IM policies, using DoD methods, tools, architectures, standards, and shared information technology resources.

- provide the Functional Activity Program Manager with expertise to support development and evaluation of proposed functional process improvements.

- assist the Functional Activity Program Manager to develop and execute an information system strategy that supports functional objectives.

- develop prototypes to serve as proofs of concept in support of functional process improvement projects.

CFI&I participates in identifying all technical and programmatic interfaces to interoperating information systems, within or between Functional Activities, derived (at various levels of detail) from functional architectures. CFI&I also coordinates major changes to individual systems with all interfacing systems to make the changes visible, assess impacts, and resolve problems or issues.

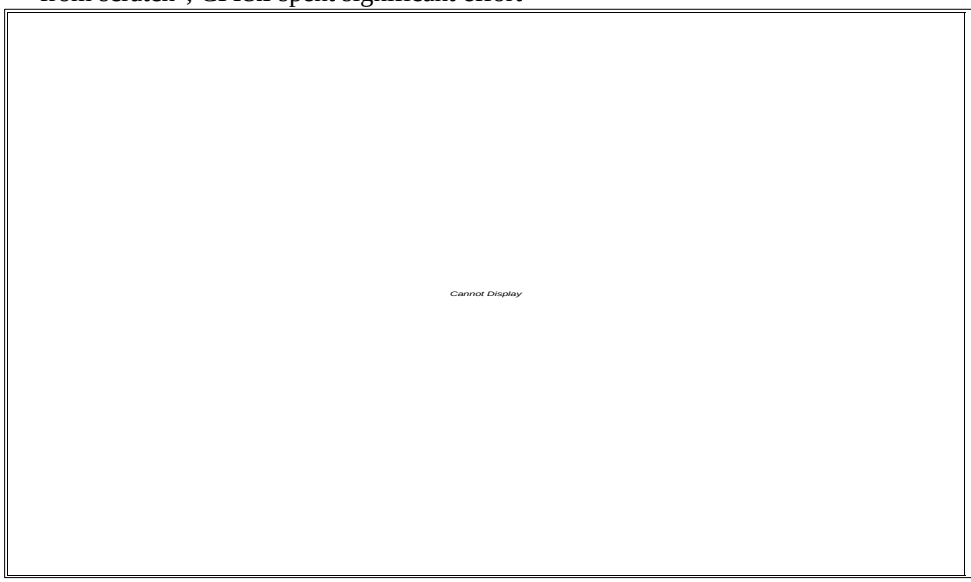
CFI&I is establishing Cross Integration Assessment panels at various organizational levels, with representatives from all interoperating functional and technical activities. The panels will manage and coordinate interfaces among information systems. The panels are charged with addressing specific areas such as databases, security,

data, communications, testing and evaluation, training, and systems management/operational effectiveness. CFI&I can advise Functional Activity Program Managers on information and system security policies and propose cost effective technical solutions.

Parallels to Private Industry

In developing its approach to integrating the DoD's information activities, CFI&I first looked to the private sector to determine what successes existed there.

Rather than attempt to design and implement an integration program -- as part of the DoD corporate IM program -- "from scratch", CFI&I spent significant effort

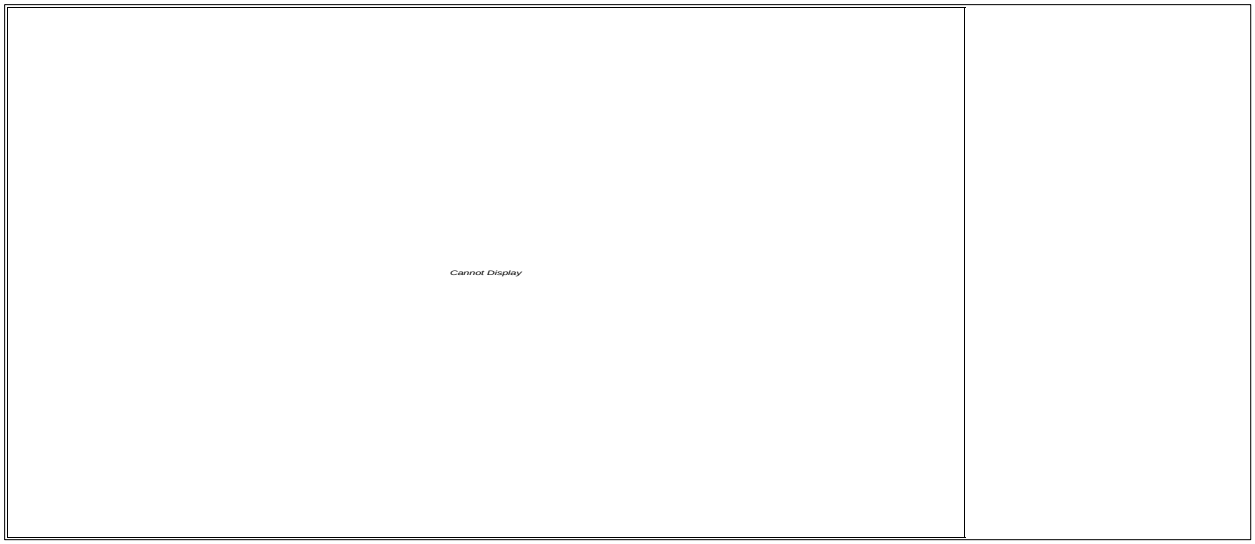


surveying the practices of the private sector. That search revealed a wealth of enterprise IM initiatives ongoing within America's larger corporations. As a consequence, upon examining the activities and initiatives now being conducted under the auspices of CFI&I, one finds significant parallels between the DoD programs and those in corporate America. The representations in Figures 4 through 7, below, depict this comparison from several perspectives.

Figure 4 compares the DoD integration effort to the private sector by examining the similarities in the major information system initiatives underway within DoD to those projects that dominate the commercial sector.

Similarly, Figures 5, 6, and 7 show how the DoD integration program has adopted approaches, similar to those in the private sector, in the specific areas of subject area focus, analytic methodologies, and computer based tools applied to integration tasks. On the left is the DoD framework. On the right are categories of business integration activities. Pasted onto the pyramid are examples of actual CFI&I activities.
The similarities between CFI&I activity categories and the DoD framework are not accidental. From the very outset of the DoD corporate IM initiative, there has been an overt effort to examine, adopt, and apply the best practices in operation within the private sector. While CFI&I expects to trade some "lessons learned" with those in the private sector on our experience within the DoD, our strategy is to continually update our own methodologies using the best practices found in private industry.

The pyramid shows that CFI&I is involved directly or indirectly at every level of the DoD information framework. For example, to one side at the top of the pyramid are integration activities aided by the Defense Integration Support Tools (DIST) (details

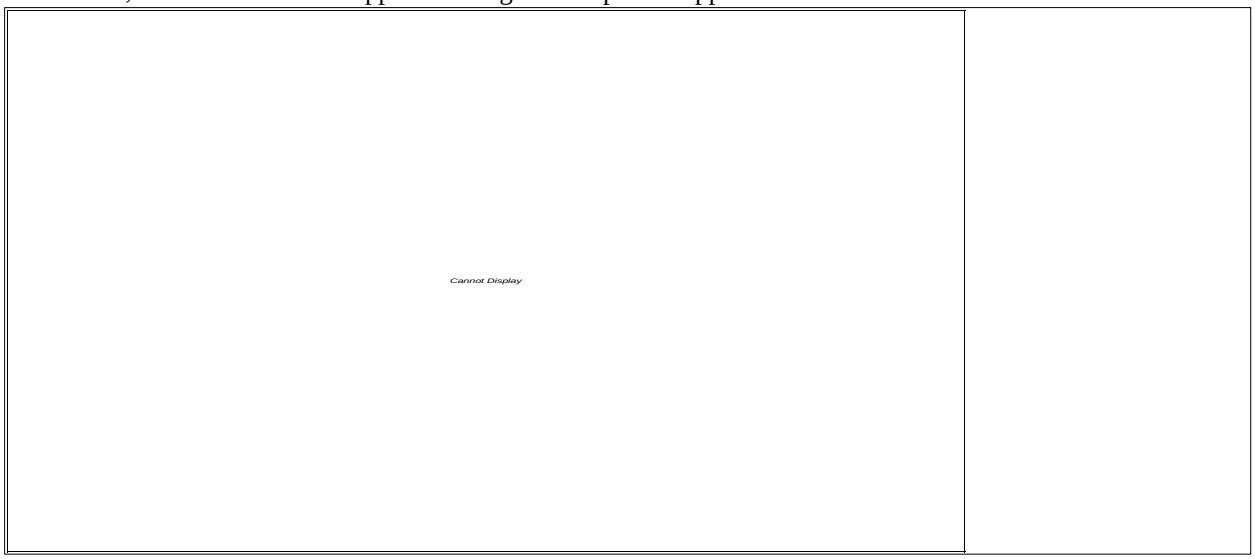


of the DIST are shown elsewhere) needed to align to Enterprise Model.

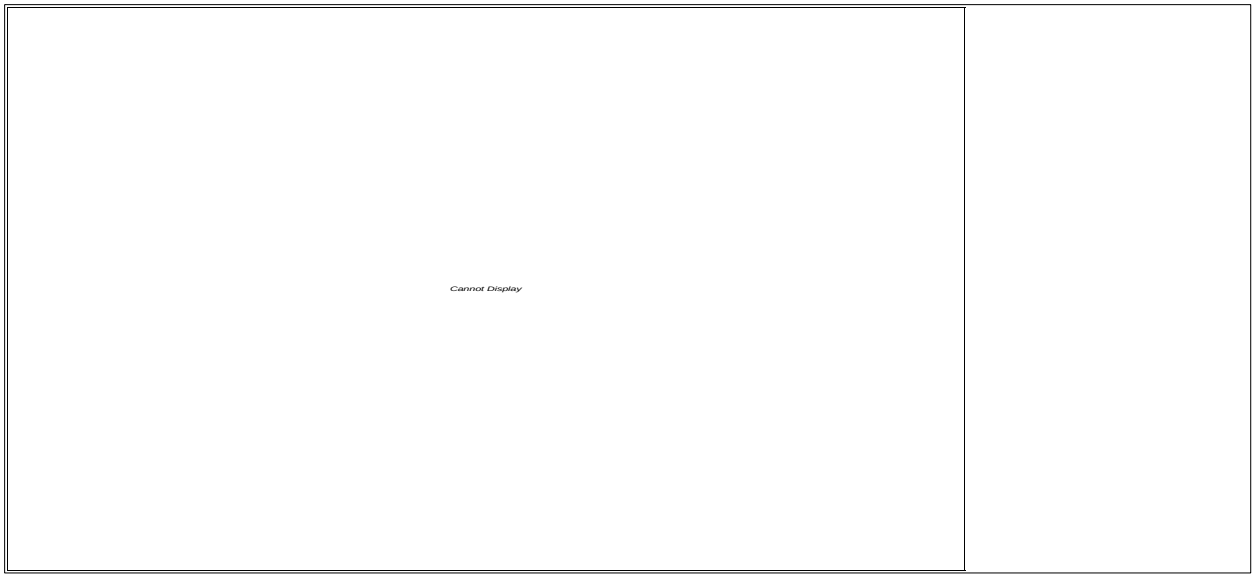
Going down the pyramid we see key elements of developing infrastructure which demonstrate a concern with the user.

Moving still further down we see depicted the constituent elements which comprise migration assessment and strategic planning.

At the base, mission elements reappear in the guise of specific application



demonstrations.



Having adopted a broad general framework, we turn to methodologies and supporting tools that flow naturally from attempting to translate this framework into satisfied end users.

Using the same rubric as the previous cross walk between activities on the DoD and business sides, Figure 6 shows the method categories needed to support the activities.

At the top is Strategic Business Planning directly supported by the enterprise model. Some methods span several levels. These are shown in vertical columns covering mission to local levels. The twin activities of integration and configuration management at the bottom of the pyramid are the kinds of methods which implement assessment decisions. Re-engineering is a prime example. As with the activities chart, the personal level ends with the user.

Methods require tools to implement tasks. Thus, CFI&I is engaged in several tool making endeavors. In Figure 7, as in the Figure 6, are exercises of strategic planning supported by execution of enterprise model versions supported by the DIST. These exercises take the form of groupware and simulation tools.

Supporting tools coming into play at the functional level involve major use of DDRS in modelling and data analysis.

Consideration of assessment at the functional level leads directly to incorporation of I-CASE to speed engineering and development related to re-engineering and reuse. As depicted, reuse is a set of tools that spans several levels of the pyramid.

Consistent with the previous two figures, the local level results in satisfied end users operating over a network.

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METHODS AND STRATEGIES

CFI&I's Directorate for Methods and Strategies (M&S) staff assesses baseline applications and ranks them according to their strongest potential to migrate to the DoD IM Open Systems Environment (OSE). The M&S staff evaluates the systems that were selected by the functional community as migration candidates, and submits their OSE-potential recommendations to functional managers. The assessment results help decision-makers prepare migration plans that consider functional, technical, data handling, and programmatic characteristics of the systems. This allows the functional and technical managers to plan how to modify and combine candidate applications for moving them towards the OSE.

Assumptions

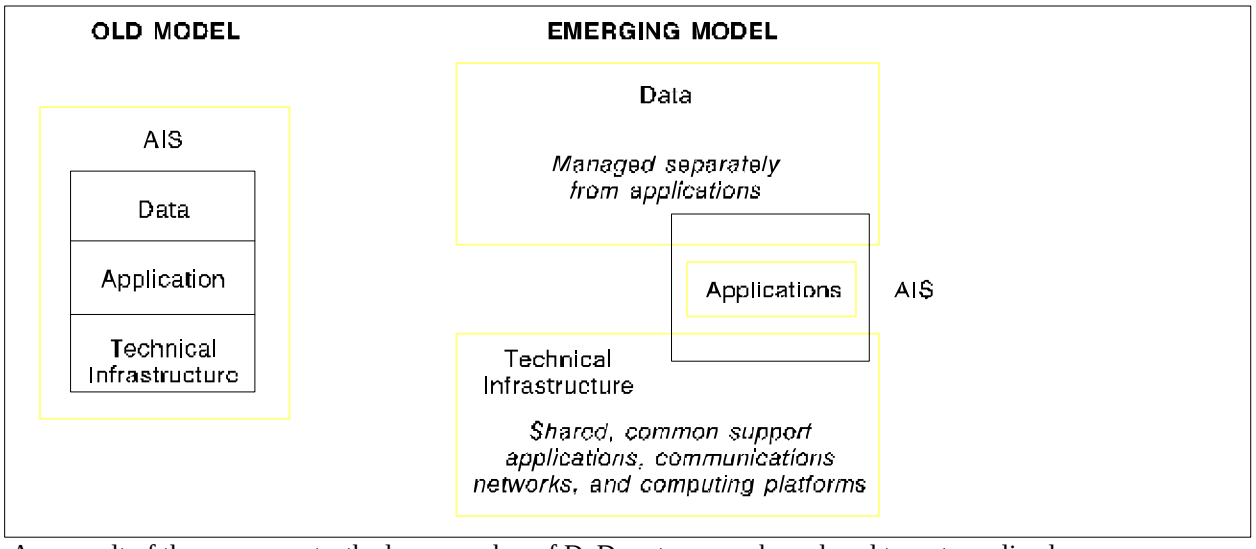
The assessment process rests on two major assumptions:

·Migration decisions affecting DoD management information will evolve toward standards mandated in the DoD IM Technical Reference Model.

·Management information requirements implemented and operating in the target applications will evolve toward DISA's DoD IM Technical Architecture Framework for Information Management (TAFIM).

Assessment Discriminants

Criteria used to assess DoD systems test compliance with DoD policy and DoD IM guidance. The system components are data, applications, and infrastructure as directed in the TAFIM. These system components are assessed for migration potential based on functional, technical, data handling, and programmatic criteria. Figure 8 illustrates the changing model. Within each area, desirable criteria used for selecting, grouping, and ranking systems would lead to TAFIM compliance with minimum technical and cost risk.



As a result of the assessments, the large number of DoD systems can be reduced to a streamlined, technically-compatible set of applications operating upon a common DoD infrastructure and a shared data structure. Finally, the migration assessment process considers information system cost reduction in DoD by selecting migration applications using programmatic factors based on cost risk.

The assessment criteria are based on the following DoD IM integration objectives (stated in the IM Executive Level Guidance and in the TAFIM):

- Manage data separately from applications
- Enter data only once
- Standardize and share data
- Move to a distributed database environment centrally managed
- Acquire commercial off-the-shelf (COTS) products for all information systems
- Use a standard applications development environment
- Implement modern software engineering practices
- Implement open systems standards

DoD IM economic objectives for return on investment are principal drivers for assessment criteria and application modification and development costs are implicit in the assessment. The following DoD IM objectives are key in determining a positive return on investment:

- Availability
- Access
- Performance
- Integrity
- Interoperability

- Durability
- Cost-effectiveness
- Functionality
- Security

The Process

The rules applied to assessments emphasize DoD IM objectives with respect to risk and cost. The top level assessment sorts and ranks systems at a high level. This high level assessment requires a minimum set of logical rules to identify systems having migration potential. These core rules have been implemented in a prototype version of the Defense Information Support Tools (DIST Version R2A). An expert system prototype provides detail on C3 systems and applications. The prototype relies on a heuristic approach using the criteria to group systems by applying various weights to rank systems and components for migration planning.

The migration assessment method is a *decision aid,* not a decision-maker. Its greatest utility is expediting examination of quantities of systems to identify strengths and weaknesses for migration. The critical work in developing an assessment method is to decide and develop a foundation for the assessment technique. The foundation defines: intended use, audience, scope, consensus of assessment criteria, level of accuracy required, and interpretation of results. Other factors include determining limitations of the method, accommodating changing priorities and values, and resolving standards and policy enforcement issues. This phase of the assessment method has dealt with functional, technical, data handling, and programmatic criteria. Ultimately, IM functional and programmatic criteria will determine final commitments to migrate any system or component.

Three Tiered Architecture Approach to Integration

In addition to the current technical guidelines already established within the Department, ASD(C3I) has set forth near-term goals for migrating toward enterprise integration.

Specifically, duplicate legacy systems need to be eliminated within the next three years. Simultaneously,

functional baselines must be established for processes, data, applications, and infrastructure. To meet these goals, data must be standardized, and security and utility considerations must be addressed. This will entail a major business process re-engineering effort.

Most enterprise functional areas use transaction based legacy systems with data embedded in individual applications. Multiple versions of the same applications and data are often used within the same function.

CFI&I, in conjunction with ASD(C3I), is encouraging a distributed processing approach

to enterprise IM architectures. This approach will keep within the current technical guidelines and will satisfy ASD(C3I)'s goals within the 3-year period.
The approach uses a 3-tiered client-server architecture in which databases are centrally controlled and access to data is provided by a server layer. Instead of passing data directly from one function to another, the data user, or "client," in the first tier will call or query the server in the second tier. The server will locate and retrieve the relevant data from databases or data warehouses of the third tier. The configuration is shown in Figure 11.

This three tiered client-server architecture will begin the evolution to a more efficient IM environment. Client calls or queries, just by their action, will identify key data, while excess data will become visible (by non-use) and targeted for elimination.

The middle server layer will also help resolve the problems of hardware and software disparities. Although two separate systems may not be compatible today, the server will be configured to act as translator, thus giving the appearance of "any-to-any" connectivity. In addition, separating client, server, and data will make it easier to change or enhance one layer without affecting the other two. Security, a key aspect of all systems, will be handled by the server as well.

The client-server approach provides an immediate solution to the management problems caused by incompatible systems operating in differing platforms using dissimilar software and hardware. It can be implemented today, while phasing out obsolete systems at the end of their life cycles.

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Defense Integration Support Tools

Background

The Defense Integration Support Tools (DIST) is an automated tool being developed under the supervision of DASD(IM) and CFI&I. The primary purpose of DIST is to provide decision makers and analysts with a tool to store, access, and analyze information about applications, data, and infrastructure.

The DIST strives to maintain a current information technology configuration database accessible to functional,

technical, and integration managers. The DIST also contains configuration information specifically required to support decisions regarding reconfiguration of the operational system components and configuration planning. Examples include: logical networks, software applications, and dynamic database distribution. Configuration information provides requirements traceability to operational hardware and software, and associated information, as determined by process and data modeling of the configuration management function. The DIST's Executive Information System (EIS) will present requested configuration information in whatever form the user desires, e.g., narrative, tabular, and graphical.

DIST information includes:

·**Resource Data** - points of contact for the application and development and maintenance personnel.

·**Tactical Integration Plan Data** - system-specific schedules, costs, benefits, and risks.

·**Integration Decision Data** - migration baseline, alternatives, and decisions.

·**Information Processing Center Data** - location ID, name, class of machines, runtime processors.

·**Application Hardware Data** - vendor, class, and operating systems.

·**Application Software Data** - languages, Computer-Aided Software Engineering (CASE) tool sets, database management systems (DBMSs), and data query languages.

·**Schedule Data** - MAISRC/DAB milestones and life cycle phases.

·**Communications Assets Data** - Local area networks and wide area networks.

Approach

DIST applications are divided into three categories platforms according to their general use:

·Help with the DIST
·Data Access
·Data Assessment features

The **Data Access** category consists of two systems that provide a tool for maintaining application and information processing centers' information:

·**Data Editor** - The data editor guides the DIST user to input and update data in the DIST.

·**DBMS Linking System** (in preparation) - Enables communication with several external databases.

The **Assessment features** - provide users with the capability to extract, analyze, and display DIST data. Its applications include:

·**Executive Information System (EIS)** - Allows ad hoc requests for application and information processing center information and statistics of all applications with an annual operating budget greater than one million dollars. Using the EIS, the DIST responds with textual and graphical

presentations.

- **Migration Assessment Tools** - Uses a rule-based structure to assess candidates for migration capability. The basic set of 80+ rules takes the form of questions covering technical, functional, programmatic, and data handling. Because of their complexity, C3 systems and applications can use an expert system feature for further detail.

- **Migration Tracking** - Provides a graphical display of all systems and applications in the data base showing their migration fate. Initial entries are the legacy systems.

- **Tactical Planning** - (In preparation) Supports planning, guidance, and control changes to applications, including those selected for migration, process improvement, and technical enhancement. This support is accomplished through readily available technical data, costs, schedules, and risks associated with each application. Output will consist of Integration Decision Papers (IDPs) and Tactical Integration Papers (TIPs).

Conceptually, the DIST centers around several databases. All connections to DIST will be via dial-up modem or Defense Data Network (DDN). The DIST is now available in Version 2a. It is designed to operate under Windows and runs best on a 486 class machine with a 80+ megabyte hard disk.

Data will come from five databases using a Link System. DoD information managers (e.g., DASD(C3I)(IM), Director of CFI&I, Integration Managers, Functional Activity Program Managers, etc.) will retrieve data from the DIST in the requested format through ad hoc query and reporting capability provided by the EIS, DSS and Technical Plans. The interface will be a character- and graphical-based user interface. In the future, DIST may also have the capability of linking with the DDRS and the RAPID Center Library.

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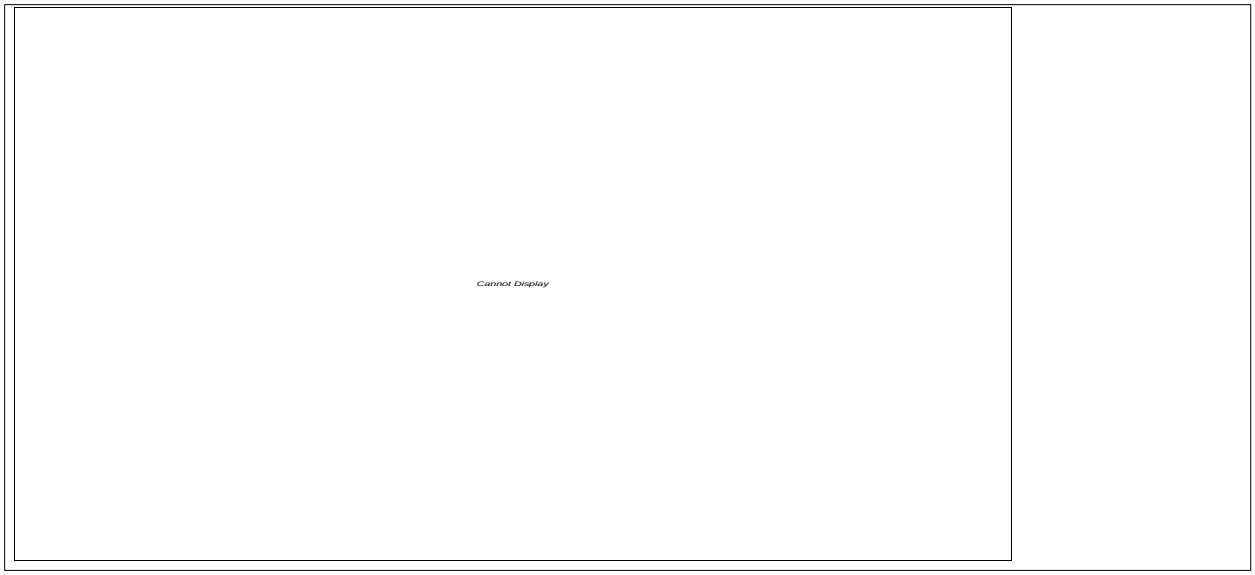

Migration Tracking System

Background

The purpose of the Migration Tracking System (MTS) is to automate the information and plans contained in the Integration Decision Paper. It is a feature of the DIST. The Report presents information on DISA's plans to improve the efficiency of applications supporting DoD business functions. DoD has thousands of existing documented applications; these legacy applications will be consolidated into a greatly reduced set of applications called migration applications. The migration applications are an interim step toward a long-term goal of implementing target applications in an open systems environment.

The MTS, thus, provides a means of recording and presenting information related to the functional task plans to consolidate existing applications into specific migration applications. The MTS diagrams provide a clear picture of current plans for migration of legacy applications, as well as past achievements. A current view of the migration program is illustrated in Figure 11 below. This automated system contains specific data on the migration paths of legacy applications, the operating costs to support the legacy applications, and the operating and development costs of migration applications. The MTS generates summary and detailed reports by functional area and activity, and at lower levels if required. Graphic and tabular reports are available in both video and hardcopy format.

Approach

Automation of the Migration Planning Report process mandates a degree of standardization of procedures and rules. While this requirement for standardization and rules may reduce the amount of flexibility, the resultant consistency in presentation enhances the use of the diagrams and reports. The following describes the information provided by the MTS:

- **Output Diagrams** - Summary and detail diagrams are created. Summary charts are used to present migration plans and progress by activity within a functional area. Detailed migration path diagrams present migration information at the individual application level of detail (specifically identifying applications by acronym) within an activity or a lower level of user defined groupings within an activity. Because the diagrams are limited to 25 applications per detailed chart,

applications must, on occasion, be further divided among multiple charts.

- **Budget Data** - Seven years of budget data reside in the data-base. Budget information is entered at the level of cost detail required for Functional Economic Analyses for each application. Expenditures and budgets are expressed in the non-escalated or "then year" dollars (the actual expected expenditure in the out year on a non-deflated basis).

Expenses and budgets cannot be allocated by Activity or group/subgroup. Even though application expenses may span Activities and group or subgroup boundaries, application system financial data is only available at the Functional Area level.

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PLANS AND PROGRAMS

The Plans & Programs directorate within CFI&I functions as a support activity to the Deputy Directors and Integration Managers. Plans & Programs serves as the focal point for all matters related to the resources (e.g., personnel, contracts, budgets) required by CFI&I to meet its customers' needs. In this role, Plans & Programs develops the budgetary needs, establishes the contractual vehicles, and acquires the human resources necessary to perform the work specified in the task orders which CFI&I has negotiated with its customers. The Defense Enterprise Integration Services program, described in the following pages, is a prime example of the role that Plans & Programs plays in direct support of the CFI&I mission.

In addition, Plans & Programs directly supports each of the Deputy Directors and Integration Managers with the scheduling of resources and the evaluation of progress achieved toward meeting our task order deliverables. In this role, the staff of Plans & Programs serve much the same function as a unit controller would in a commercial profit center. With the assistance of the Plans & Programs representative, the Deputy Directors and Integration Managers manage the performance of their resources toward completing the task orders they have negotiated. Schedule and resource issues, thus, receive early management attention and resolution in order to minimize any impact upon the customer.

Finally, Plans & Programs provides the continuity between the internal management control of CFI&I's task order activities and the external resource reporting and evaluation activities within DISA. For example, Plans & Programs handles all inputs to the various activity and budget execution reports. In this manner, Plans & Programs ensures a consistent and timely interface to the other budget and resource activities within DISA while freeing the Integration Managers and Deputy Directors to focus on the needs of, and deliverables for, our customers.

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Defense Enterprise Integration Services

Purpose

The Defense Enterprise Integration Services program will support DoD enterprise information integration activities within and across functional areas by providing integration services and integration engineering support.

The program objective is to deliver to DoD a seven-year contract for DoD-wide integration services. Defense Enterprise Integration Services will also be available to non-DoD activities with requirements for integration services.

Background

DISA has been assigned DoD-wide integration responsibilities. DISA established CFI&I to carry out these responsibilities.

Integration within DoD has historically been approached in a vertical manner from within a specific program or functional area. The Defense Enterprise Information and Integration Management initiative recognizes the necessity of approaching integration horizontally as well as vertically and requires a major re-engineering and restructuring of business methods and administrative processes throughout the Department.

The program will support CFI&I in meeting its responsibilities for integration. As CFI&I develops integration strategies and guidance, other DoD agencies and activities will implement these strategies and guidance. Thus, the program will provide services at all levels of integration to potentially all DoD and component organizations with integration responsibilities, as well as to non-DoD activities.

Approach

The Defense Enterprise Integration Services program is being approached as a Trail Boss acquisition under the General Services Administration's Trail Boss Program. The acquisition is for an Indefinite Delivery/Indefinite Quantity Task Order type contract. Multiple contracts will be awarded. The award date is scheduled in late FY93.

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COMMAND, CONTROL & INTELLIGENCE

The Directorate for Command, Control and Intelligence (C2I) conducts integration of IM initiatives across the

entire spectrum of command, control, and intelligence processes supporting the operational commanders and their warfighting forces. The focus of this work is on the evolution and migration of **integrated** information systems/capabilities across the Commander in Chiefs (CINCs), services, and agencies (C/S/As) so that warfighting commanders will have, at the right place and the right time, ***all*** the information needed to derive a consistent picture of their battlespace and conduct coordinated and synchronized joint and/or combined operations. The umbrella framework for this systems evolution, development, integration, and migration is the functional integration model known as the "Command, Control, Communications, Computers, and Intelligence for the Warrior" (C4IFTW) Initiative. Integration for the C2I domains is accomplished by a task-matrix-organized set of Integration Managers -- Global C4 Integration, Theater/Tactical C4 Integration, and Operations/Intelligence Integration -- working together, and with the C4IFTW Joint Program Integration Office, to accomplish a coordinated and integrated effort that contributes to the overall goal.

Current C2I IM initiatives include:

·Support to the Joint Staff and warfighting CINCs for development and implementation of the C4IFTW capability

·Support to the Pacific Command (PACOM) in the development and testing of prototype systems that will support operations in a Joint Task Force (JTF) environment

·Addressal of the "seam" between the Operational and Intelligence communities with a focus on harmonization/rationalization of standards and essential elements of information, and integration/migration strategies for integrated information systems/capabilities supporting the two communities

·Development of strategies and tools for evolution and migration of C4IFTW systems and capabilities to include

- C4I Systems Description Data Repository for all C4I systems
- C4I Systems Assessments and Migration proposals

·Support to C4I systems integration efforts across the C/S/As

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C4I for the Warrior

Background

The Joint Staff developed the C4I for the Warrior (C4IFTW) concept to establish interoperability among our forces through an objective concept, focused on the joint warfighter, and designed to achieve unity of effort by the C/S/As in providing C4I support to the warfighter as we transition into the 21st Century. The concept was established to adapt to our changing world environment and National Military Strategy. These dictate that our

focus change toward Regional Conflicts and Crisis Management/Response rather than a war in central Europe with (formerly) the Soviet Union. Our force structure will be reduced, with less dependence on forward (overseas) basing. These forces will have to be flexible, agile, and capable of rapid deployment anywhere in the world on short notice. The form/structure of our deployment packages, as evidenced by operations since Operation DESERT STORM, will be as a JTF, and will often involve forces from other countries in a coalition.

The concept focuses on providing the operational commanders a fused, real-time, consistent picture of their battlespace along with the information systems/capabilities required to plan and coordinate (both horizontally and vertically), issue orders, respond, and assess battle damage to the degree necessary to prosecute their missions successfully. The goal of the concept is to provide a common objective, or vision, for all C/S/As as well as a planning road map which will support achievement of the required near-term interoperability and migration toward the longer-term objective in a phased, evolutionary manner.

Approach

The C4IFTW objective concept calls for a global network of military and commercial communications systems linking information databases, information processing centers, and intelligence fusion centers which are accessible by the warfighter anytime, from wherever he might be deployed, in the performance of any mission. The road map to achieve this objective concept consists of three overlapping phases, all of which begin **now.** The **"Quick-Fix" Phase** began with the development of the concept and extends through the current Program Objective Memorandum years. Its goal is to achieve near-term interoperability between existing systems through development of "translators" and information standards, synchronization of C4I architectures, and establishment of a solid foundation of joint inter-operability policy and operational doctrine.

The interim phase, called the **Mid-Term Phase**, extends into the next century. A "CINC-to-Shooter" strategic/joint tactical "network of networks" is established comprising modular C4I nodes, common/interoperable information switches linked via common/interoperable communication media.

The final **Objective Phase** employs advanced technologies to achieve the development of the integrated global "infosphere" allowing the warfighter worldwide access from an individual multi-functional, multi-media terminal.

Various initiatives have begun addressing C4IFTW objectives:

- "Translator" Development
- Data Element Standardization
- Review and Consolidation of USMTFs
- Secure Tactical Data Network (STDN) Demonstrations
- Interoperability Policy
- Interoperability Management
- Interoperability in Doctrine and Procedures
- Interoperability Standards
- Interoperability Testing
- Interoperability in Exercises
- Combined Interoperability

CFI&I is involved in each of the C4IFTW initiative areas, working with the OSD, Joint Staff, services, other agencies, and internal to DISA. For example, the STDN Demonstrations are a supporting pillar of the C4IFTW program of the Joint Staff. STDN demonstrations migrate new technology from the laboratory to the field for operational test and evaluation and assist the integration of new commercial products and technology exercise to a multi-service operational environment which tests both new technologies and operational concepts. The CFI&I C2I Directorate has been a primary force in the STDN demonstration series by providing integrated efforts of diverse organizations and tasks, as well as planning and execution of the series. CFI&I provides both guidance

and independent operational evaluation of the demonstration results. The success of the demonstrations can be attributed to CFI&I C2I involvement.

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C4I for the Pacific Warrior

Background

The C4I for the Pacific Warrior (C4IFTPW) initiative is to be a demonstration and validation of key capabilities of the C4IFTW concept. The initial capability will be developed by focusing on JTF operations in the Pacific Theater and gleaning "lessons learned" that can be extended readily to other Theaters as C4IFTW "Quick-Fixes" and Mid-Term improvements.

The Commander in Chief, Pacific (CINCPAC) has taken a leadership role in a number of important initiatives that were recommended by the post-DESERT STORM report of the Flag-level Functional Analysis and Consolidation Review Panel. These recommendations are central to achieving and implementing the C4IFTW concept:

- Developing the operational concept for JTF deployment, crisis management and warfighting;
- Adopting a streamlined "two-tiered" structure for Theater command and control; the two tiers comprising the **CINC and his <u>direct</u> subordinate, the Commander Joint Task Force (CJTF)**, with the Component Services now reporting to the CJTF in a support role;
- Implementing a lean "extended staff" structure in which the PACOM staff is augmented by staff from the on-island Component Commands during crises; and
- Implementing information management capabilities/systems to support the collaborative/distributed planning and execution process inherent in the JTF operational construct.

Approach

CINCPAC has developed a matrix of command and control system features against the major functional capabilities required in order to allow the accomplishment of the PACOM JTF mission areas. Those required capabilities are:

- CINC-to-CJTF (Deployed)

·CINC-to-Service Components
·CINC-to-CJTF (In-Garrison & Submitted)
·Theater Anchor Desks
·CJTF-to-JTF Components
·JTF Components to Service Components & Anchor Desks
·JTF Component-to-Component

The CINCPAC approach to achieving the required capabilities includes:

·Implementing the PACOM Crisis Management System on a communications backbone shared by **operational** C3 systems and the **simulation** community (the Defense Simulation Internet -- DSINet) to effect cost-effective exercise/wargaming capabilities;

·Establishing "anchor desks" to support CINCPAC's "extended staff" in the collaborative/distributed planning community comprising CINCPAC, the CJTF and Subordinate Commands/Forces, and the Component Services;

·Leveraging DISA initiatives/programs, the Global Grid concept, and the Navy's Copernicus initiative to extend these capabilities to the (deployed) CJTF and his subordinate warfighting forces

·Testing candidate prototype capabilities/subsystems in the PACOM AOR in contribution to the evolution, development, and migration of the global C4IFTW capability

The successful conclusion of these efforts will result in an operational capability that will remain in the Theater for use by PACOM. DISA believes that completion of the C4IFTPW testbed activities, with the resulting operational capability for PACOM and the potential for high-payoff technology applications, is a very high priority effort that will accelerate the development of the **global** C4IFTW capability. The C4IFTPW Initiative will serve as the crucible for testing joint C4I warfighting doctrine and concepts of operation, mission functionality, technology insertion, and approaches to capability/system migration potentially adaptable to all CINCs and Theaters.

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Operations/Intelligence Integration

Background

A major area addressed by the Functional Analysis and Consolidation Review Panel and rigorously endorsed by the ASD(C3I) in his support of the C4IFTW Initiative, is the need for much greater integration of IM capabilities, techniques, and systems among/between the Operational and Intelligence communities. This need includes operational doctrine and procedures for intelligence exchanges NCA-to-CJTF and Subordinate Forces, data

element standards, collection, processing platforms, fusion, and dissemination from "sensor-to-shooter".

Approach

In response to the concerns of the ASD(C3I), the CFI&I's C2I Directorate recently established a Manager for Operations/Intelligence Integration. This element of the Directorate is responsible for establishing working relationships with the appropriate elements of the Operations and Intelligence communities -- including the J-2/J-3/J-6 elements of the Joint Staff and the warfighting CINCs, the National Foreign Intelligence Program, the General Defense Intelligence Program, Tactical Intelligence and Related Activities, the Defense Intelligence Agency, and the Intelligence arms of the services. This activity is an integral part of the Directorate's support to the C4IFTW Initiative. Efforts are already underway in the following areas:

·Support in the evolution of the PAC Crisis Management System within the C4IFTPW Initiative;

·Collaborative efforts with IPSG/INCA including:

- rationalization of standards for essential elements of information, processing capabilities and intelligence dissemination;
- increased near-term inter-operability among/between the capabilities/systems of the two communities;
- rationalization of procedures for the Ops/Intel commun-ities in JTF operations;
- migration strategies for Ops/Intel capabilities and systems;

·Support to JCS J-2/J-6 in Ops/Intel integration activities;

·Support to a newly established DISA/CIO initiative for improving the dissemination of imagery products from NCA-to-JTF and Subordinate Forces;

·Support to DASD(CI) in structuring DoD's evolving Counter Intelligence Program;

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Evolutionary Strategy for C4I Systems

Background

It has become readily evident during the development of the C4IFTW concept that the evolution of systems to support future command and control requirements will be a long-term and demanding task. The number of command and control applications already in existence is enormous and the insertion of new technologies is expanding the support to command and control. If migration toward a fully integrated C4I system is to occur, an overall migration strategy and supporting tools will be needed.

Approach

In the fall of 1992 the C2I Integration Manager initiated a multi-disciplinary approach for developing an overall information system migration strategy and providing the technical considerations needed to accomplish that strategy.

A two-tiered approach is being developed. First, the operational, technical, and economic factors which are applicable to the continued utility of a system will be organized and an integrated algorithm for assessing systems developed. Operational factors include contribution to missions, functions and commands. Technical factors include such constructs as adherence to standards, potential for migration to open systems, and age of applied technology. Economic factors include the cost of modification, cost of continued use, and cost of development. There are numerous and multifarious factors or "policy fragments" which must be consolidated into a coherent structure for systems evaluation. Because the number of information systems supporting command and control is very large, an assessment effort can benefit from the use of automated tools. Consequently, an effort to embed the assessment algorithm in a COTS expert system automated tool is being pursued as part of the strategy development. The assessment method and tool will assist in the selection of information systems for mid-term migration.

Once migration systems have been selected, it will be necessary to develop specific plans for modifying systems and introducing new technologies so that an integrated capability to support command and control can be evolved which contains all of the required functionality, but eliminates duplication. The operational, technical, economic, and additionally, technology factors necessary for systems migration will be consolidated into a composite structure and an associated migration algorithm developed. The use of COTS automated information system support will be advantageous in this process, as well. The end product of this migration strategy for C4 systems effort will be a methodology and associated automated information tools for assisting the C/S/As in the selection of C4 systems migration candidates and migration planning toward future integrated capability. Concurrently, a detailed C4 information systems baseline description database is being constructed to support migration decision efforts. The Systems Description Database will contain information about the operational, technical, and economic or programmatic aspects of the system. Information will be available to planners, system architects, and system developers. This project involves multiple agencies and contractors, integrated into a single effort.

The C4I Systems Description Database is under construction and will include some 4000+ complex systems descriptions. The data profile has been modified to accommodate a number of organizations who will use the information. The data is currently housed in an application known as the "Shubox" until the DIST application (described on page 18) can be modified to accommodate classified information. Collection of C4I systems data will be an on-going effort. The CFI&I C2I Integration Manager has supported the Joint Staff by providing summary systems descriptions. The C2I Integration Manager has also supported the Joint Staff in the developing a systems evolutionary strategy known as "Rightsizing." By the end of FY94, a systems assessment and migration planning methodology and supporting automated tools will be available for general use.

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FINANCE, PERSONNEL & HEALTH

The Deputy Director for Finance, Personnel & Health (F, P & H) stands ready to provide custom tailored integration support services to the F, P & H functional and technical communities. An experienced staff is on hand to deliver new technology proof-of-concept prototypes, migration plans, Integration Decision Papers, Tactical Integration Plans, or other integration products as required. The notable engineering expertise resident in the Joint Interoperability and Engineering Organization, as well as outstanding contract support from corporations that have earned excellent reputations in both the Government and industry are among the resources that can be brought to bear to deliver solutions, working within available budgets and required timeframes.

Examples of accomplishments and on-going efforts for current customers are outlined below. Copies of the studies, reports and other documents described are available either through the Defense Technical Information Center, or through CFI&I.

F, P & H products and expected follow-on initiatives include:

·Finance Near-Term Technical Architecture - We will publish expanded versions of the Architecture that align with the Business Operations Technical Architecture currently in development.

·Finance Technical Integration Guidance - We have produced documents covering Client/Server, Communications, User Interface, and Workstations for the Finance community. Similar guidance documents for the other functional areas are planned.

·Technical Assessment of Selected Integrated Databases - Future plans call for the acquisition/construction of a prototype DoD integrated database.

·Mission Support Technical Migration to the DII Architecture - This effort will provide a consolidated technical architecture for the level 1 integration between the Enterprise and Mission layers.

·Communications and Security Architecture Model for the Military Health Services System (MHSS) - A migration strategy to implement this architecture is planned.

·Composite Health Care System (CHCS) Wide Area Network (WAN) Prototype Implementation and Test Plan - We will produce a detailed report documenting the results is to be produced.

·Navy Medical Information Management Center Local Area Network (LAN) Prototype - The ultimate goal is to provide a standard communications infrastructure for interconnection of Medical Information Systems in full compliance with Government Open System Interconnection Profile (GOSIP) for connectivity.

·Standards Based Architecture for Health Care Delivery in a Theater Environment - The eventual product will be an Architecture Administration Framework document.

·Mission Support Area Requirements for Defense Information Systems Network - Near Term (DISN-NT) Support - This initiative will produce a report that identifies and records the communications requirement of the mission support areas of the F, P & H, and Materiel/Logistics,

that must be supported by the DISN-NT, 1-3 years.

·Health User Interface Guidance - We will provide an operational proof of concept for an enhanced clinician's interface for the order entry and results retrieval applications of the CHCS.

·TRANSCOM Regulating and Command and Control Evacuation System Proof of Concept - The final deliverable will be an operational proof of concept software design with air evacuation algorithms and general purpose ad-hoc user query capabilities.

·Civilian Personnel Database - A prototype is planned to demonstrate a single integrated personnel system incorporating personnel and pay information on civilian personnel from all DoD Services and Agencies.

·Reserve Personnel - An Integrated Definition (IDEF) analysis of Special Operations Command is nearing completion; a preliminary Technical Baseline, Technical Plan and Technical Architecture and a preliminary Technical Baseline for the Reserve Component Automation System have been developed. We are planning similar efforts to support other Reserve Component organizations.

·Military Personnel - Information about potential Military Personnel migration systems has been fed into the MTS (described on page 21). Once a Military Personnel migration system is selected, we will produce technical guidance for use by system developers.

Finance

The Integration Manager for Finance provides integration support and services to the Finance functional community.

Objectives of the Integration Manager for Finance are to:

·Be responsive to the integration requirements of the Finance community.

·Provide integration guidance and support services to the Defense Finance & Accounting Service (DFAS), the DoD Comptroller, and the Defense Information Services Organization (DISO).

·Develop approaches and solutions to support Finance integration which can be exported to all functional areas.

The Integration Manager for Finance brings together teams of experts from throughout DISA to analyze and develop guidance that complies with DoD and DISA policies and programs including enterprise IM, DISN, security, standards, etc. The Integration Manager for Finance develops integration guidance for use by DISO in developing information system solutions for DFAS and for the DoD Comptroller.

Current efforts of the Integration Manager for Finance support the Finance functional area in moving from 272 legacy applications to 9+ Finance Migration Systems. Functional activities and migration systems being supported are:

Civilian Payroll	Defense Civilian Payroll System (DCPS)
Contract & Vendor Payment	Mechanization of Contract Administration Services (MOCAS)
Debt Management	Defense Debt Mgmt System (DDMS)
Defense Business Operations Fund	Defense Business Management System (DBMS) and Marine Corps Total Force System (MTFS)
Disbursing Foreign Military Sales	